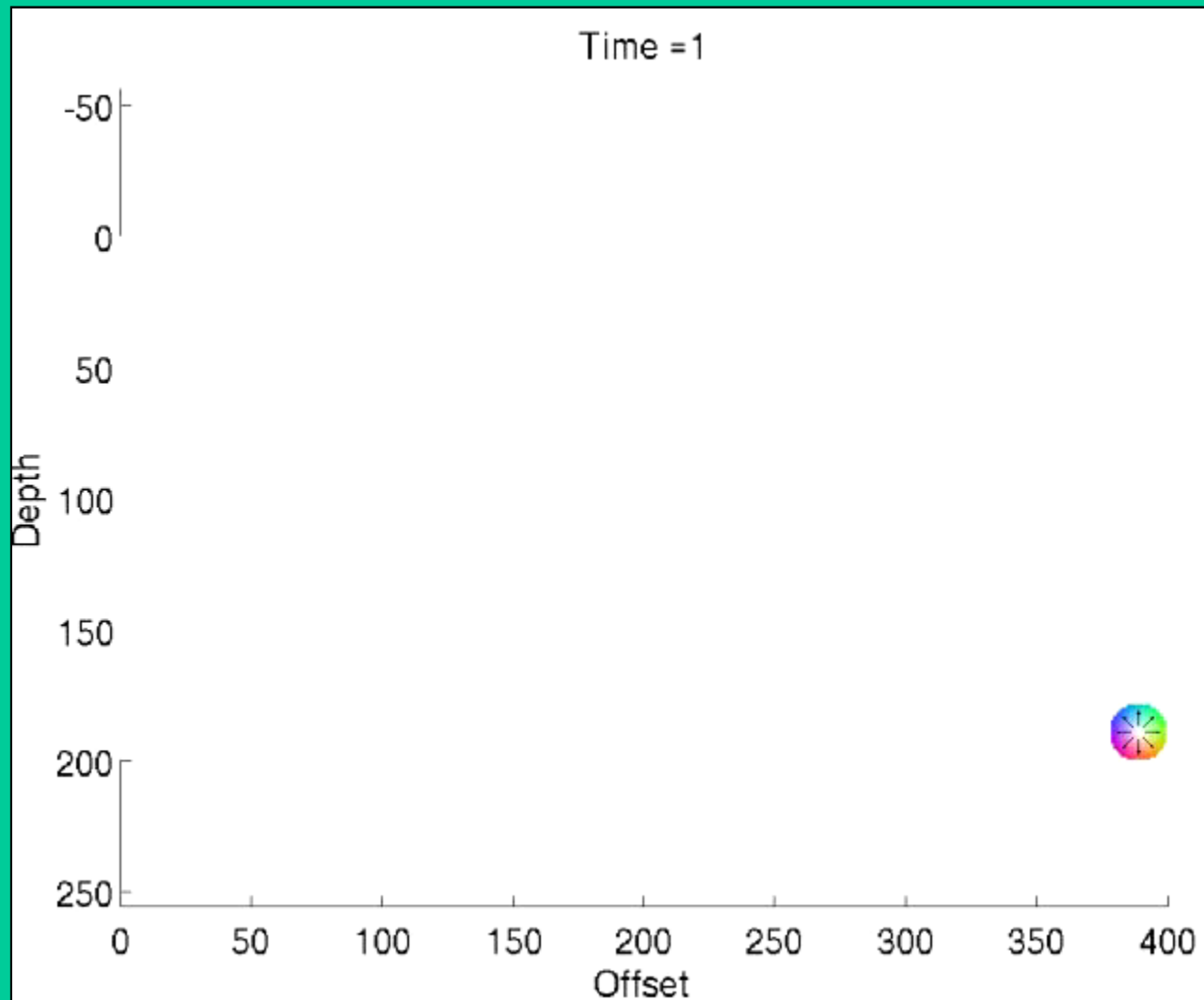# Rayleigh wave numerical modelling
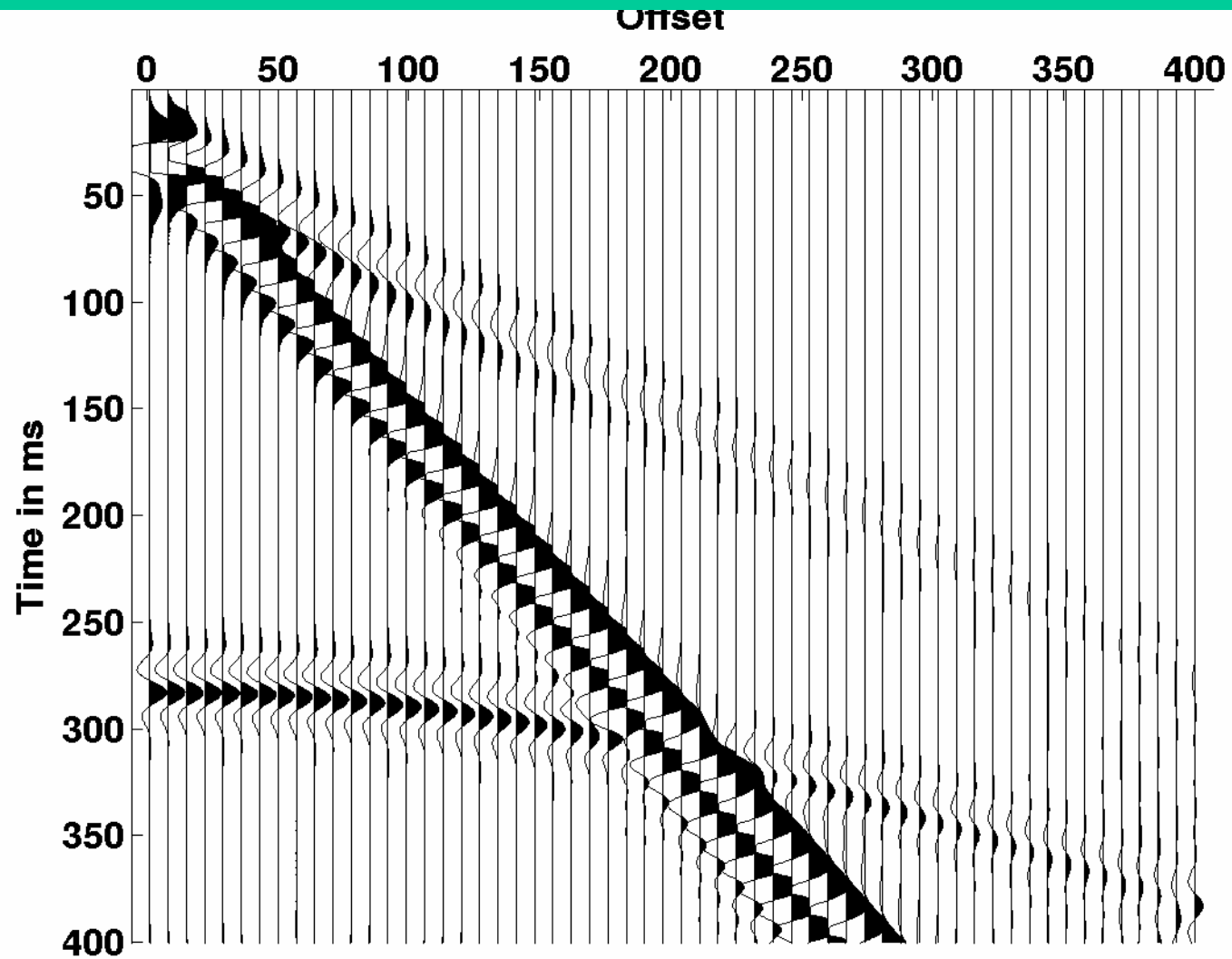
Peter Manning and Gary Margrave

- Rayleigh waves on shot records
- A detailed look at a Rayleigh wave
- Simple Rayleigh wave reflections/transmissions
- Effects of thin layers
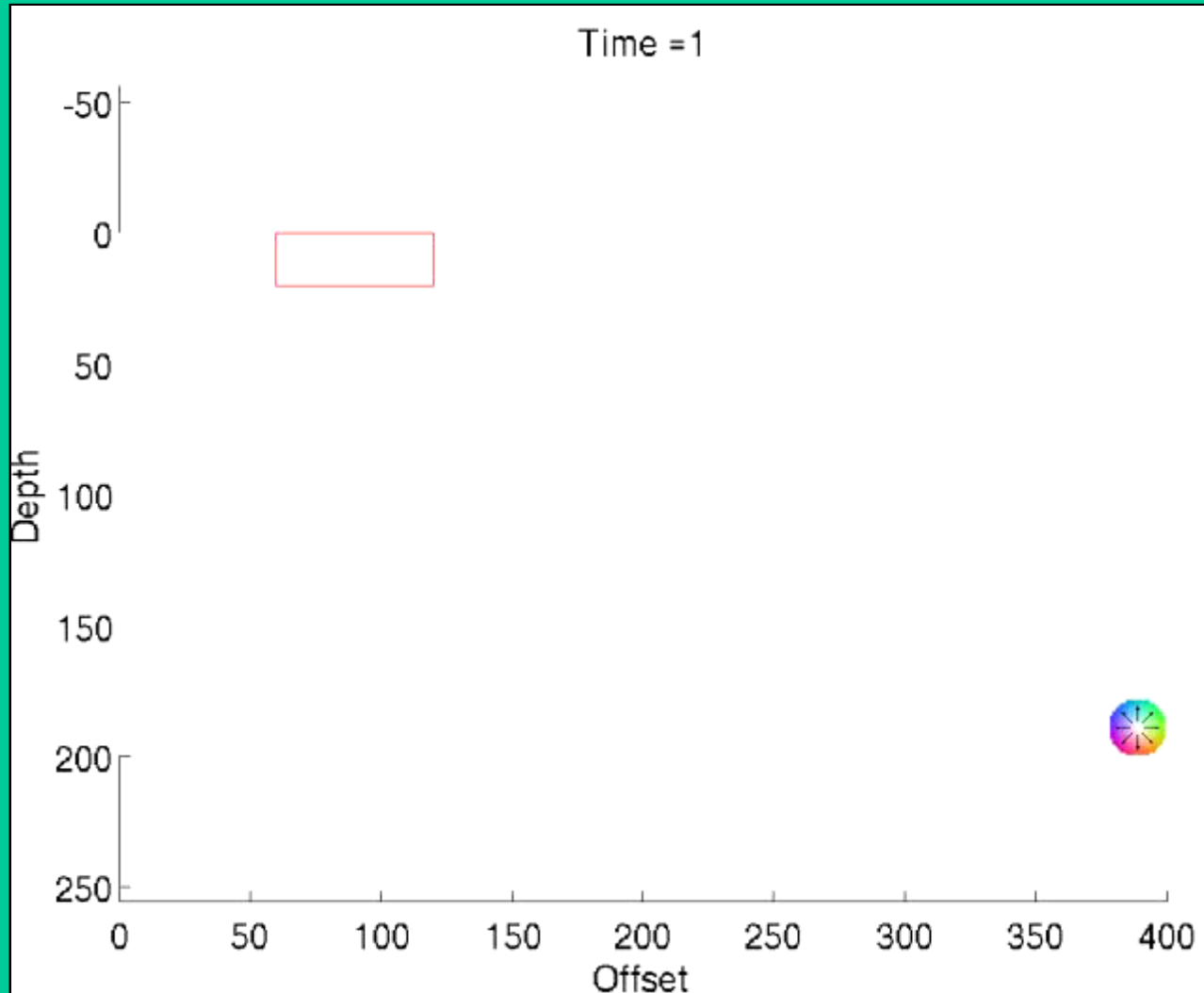- Conclusions
- Acknowledgements

CREWES

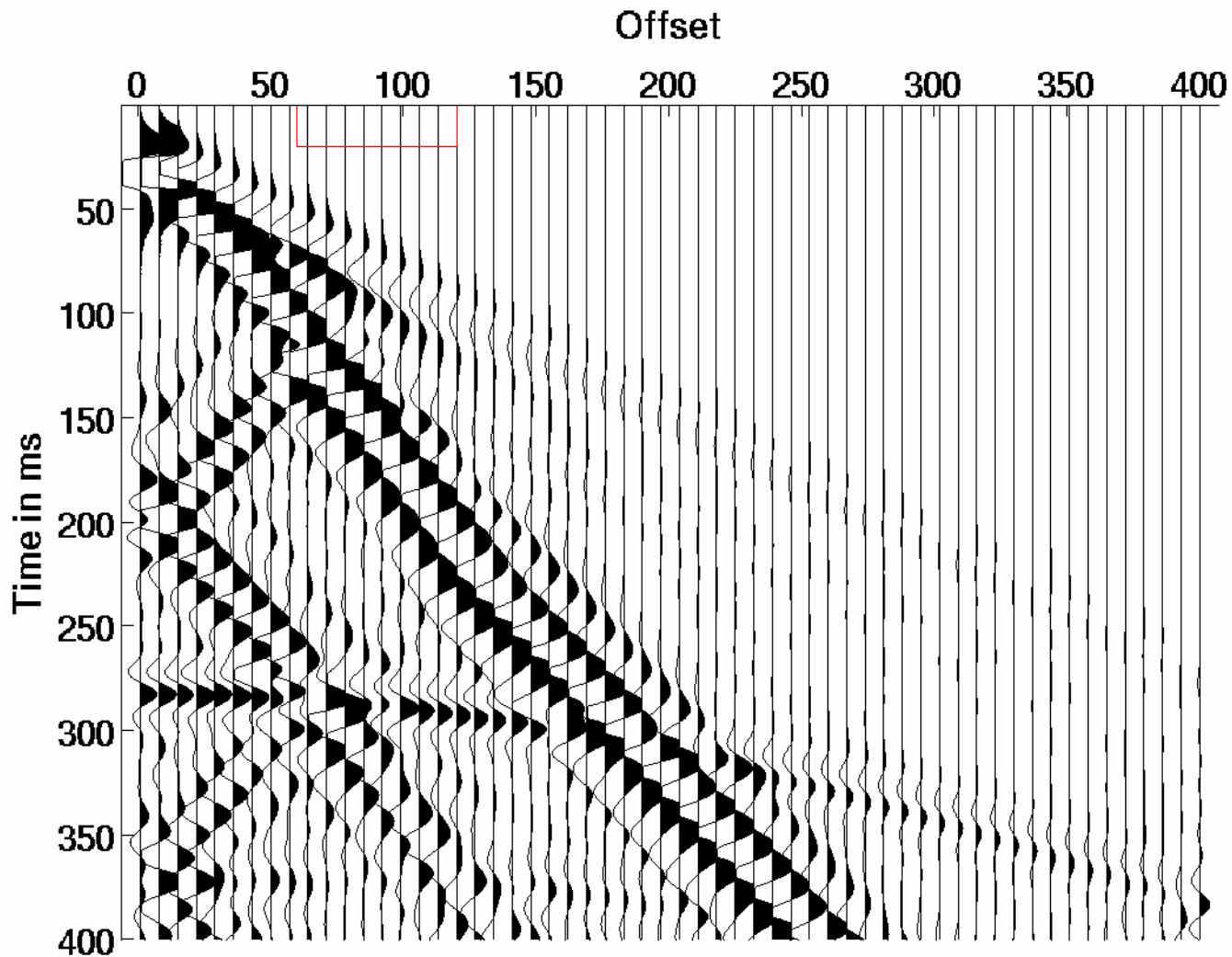# Events from an explosive source

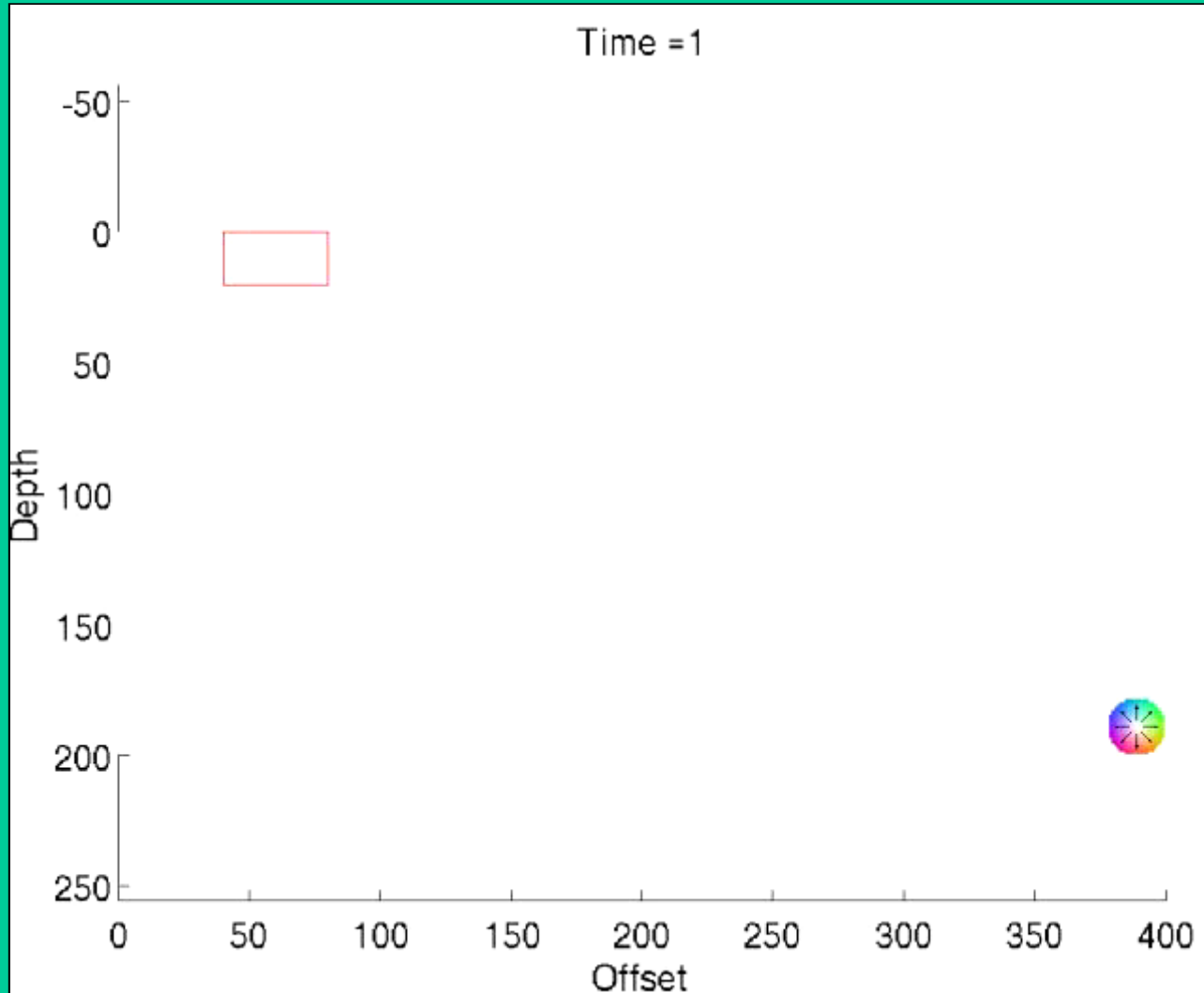# Seismic from an explosive source
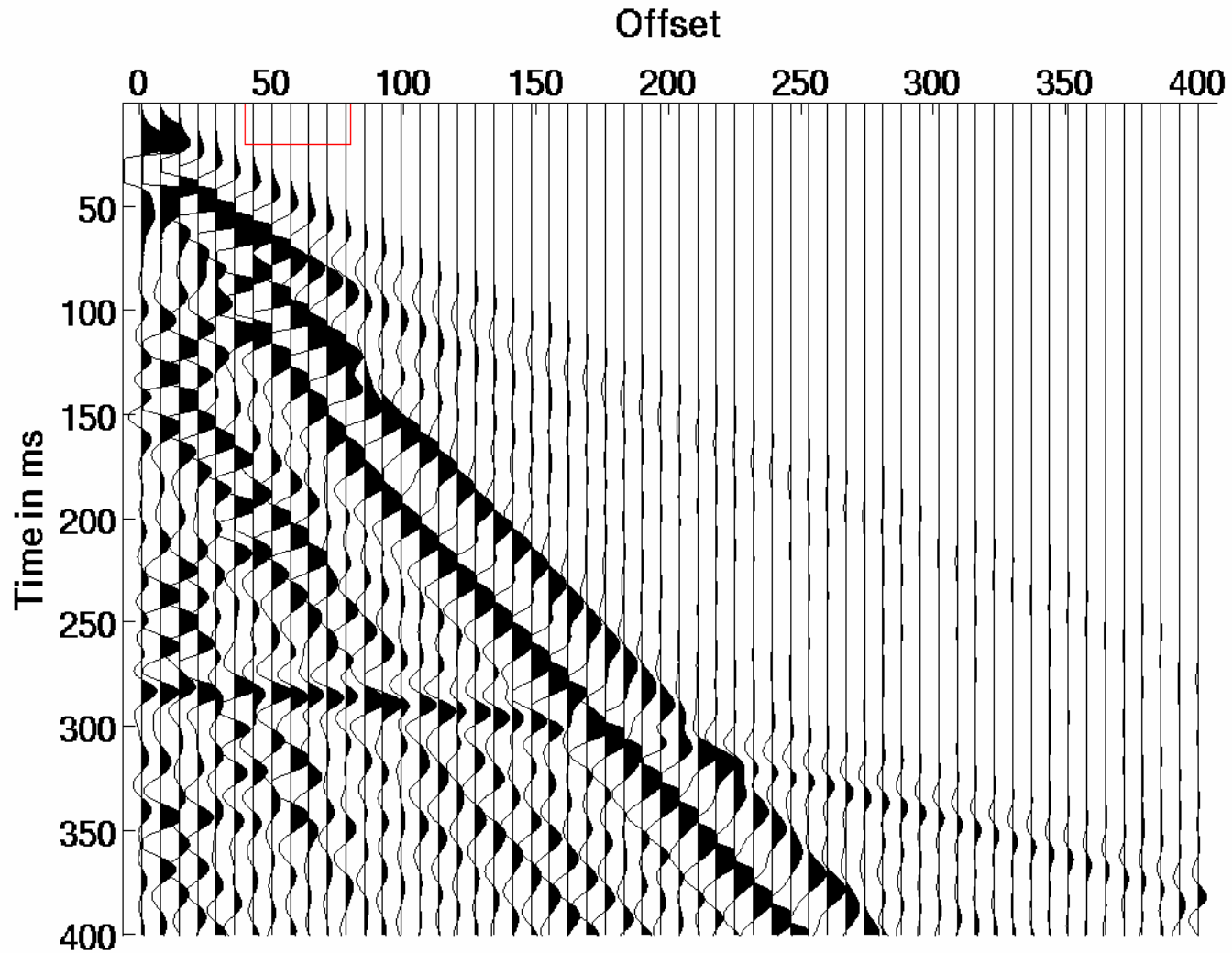
Events near a low shear velocity zone

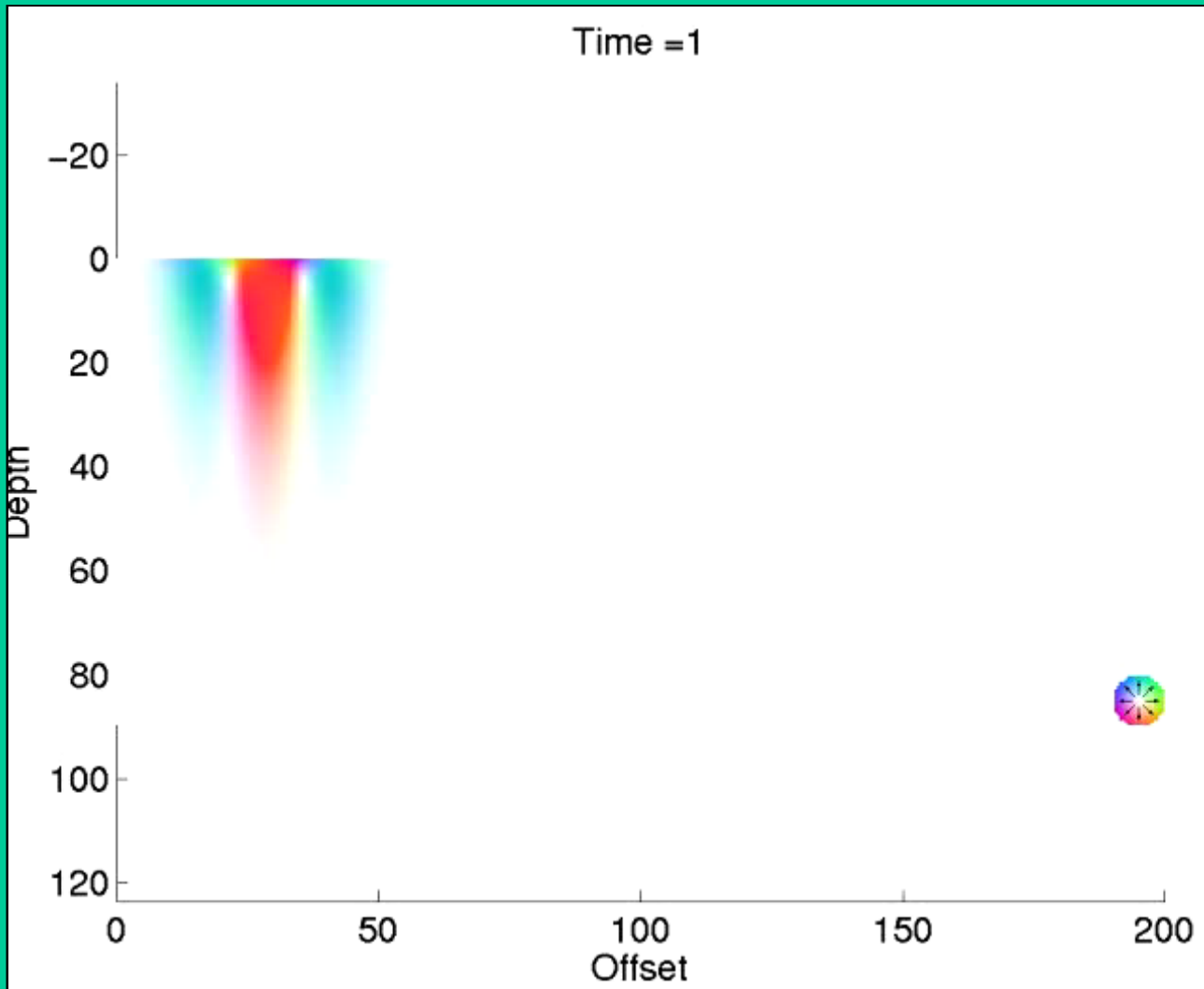# Seismic near a low shear velocity zone

Events nearer a low shear velocity zone
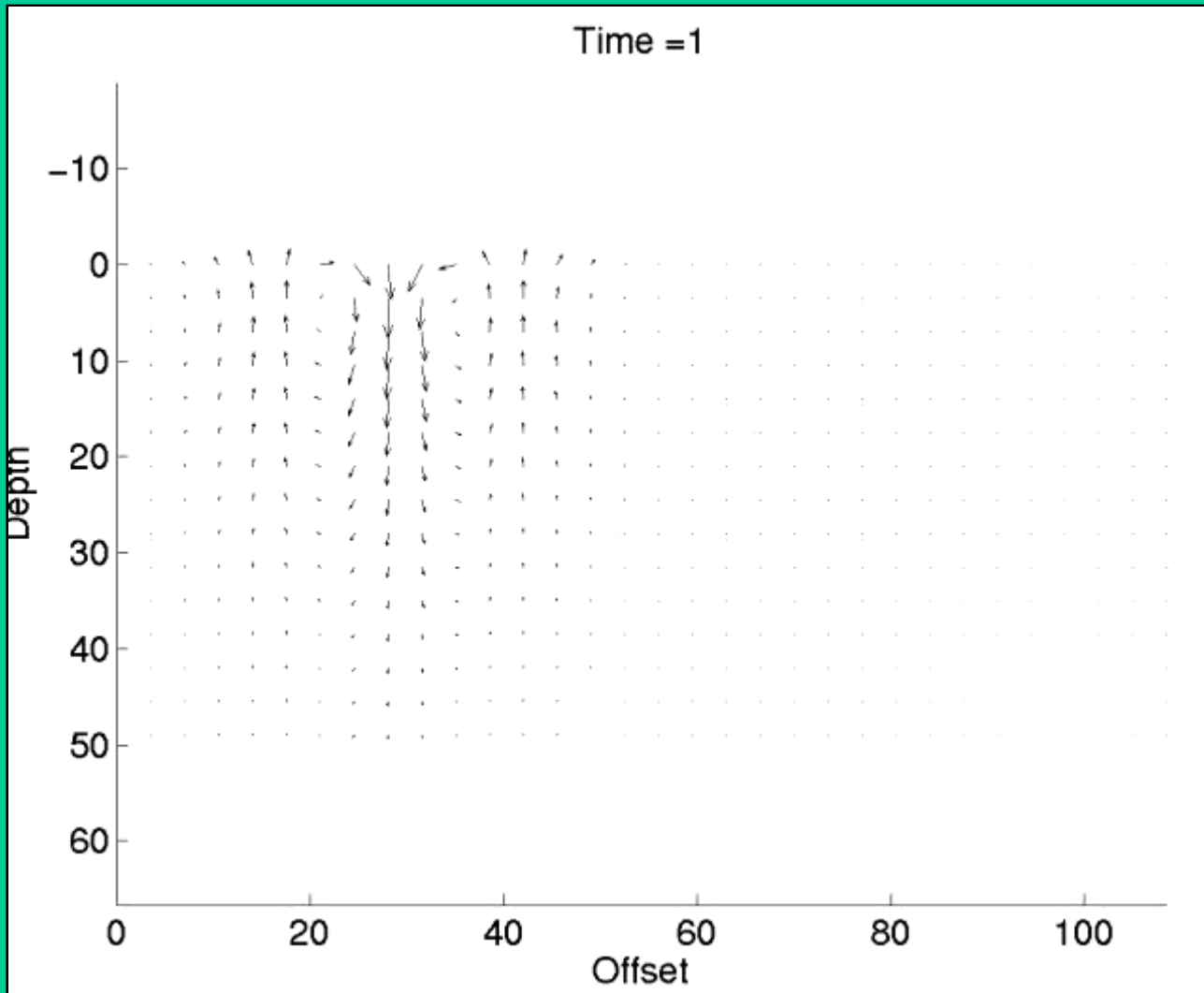
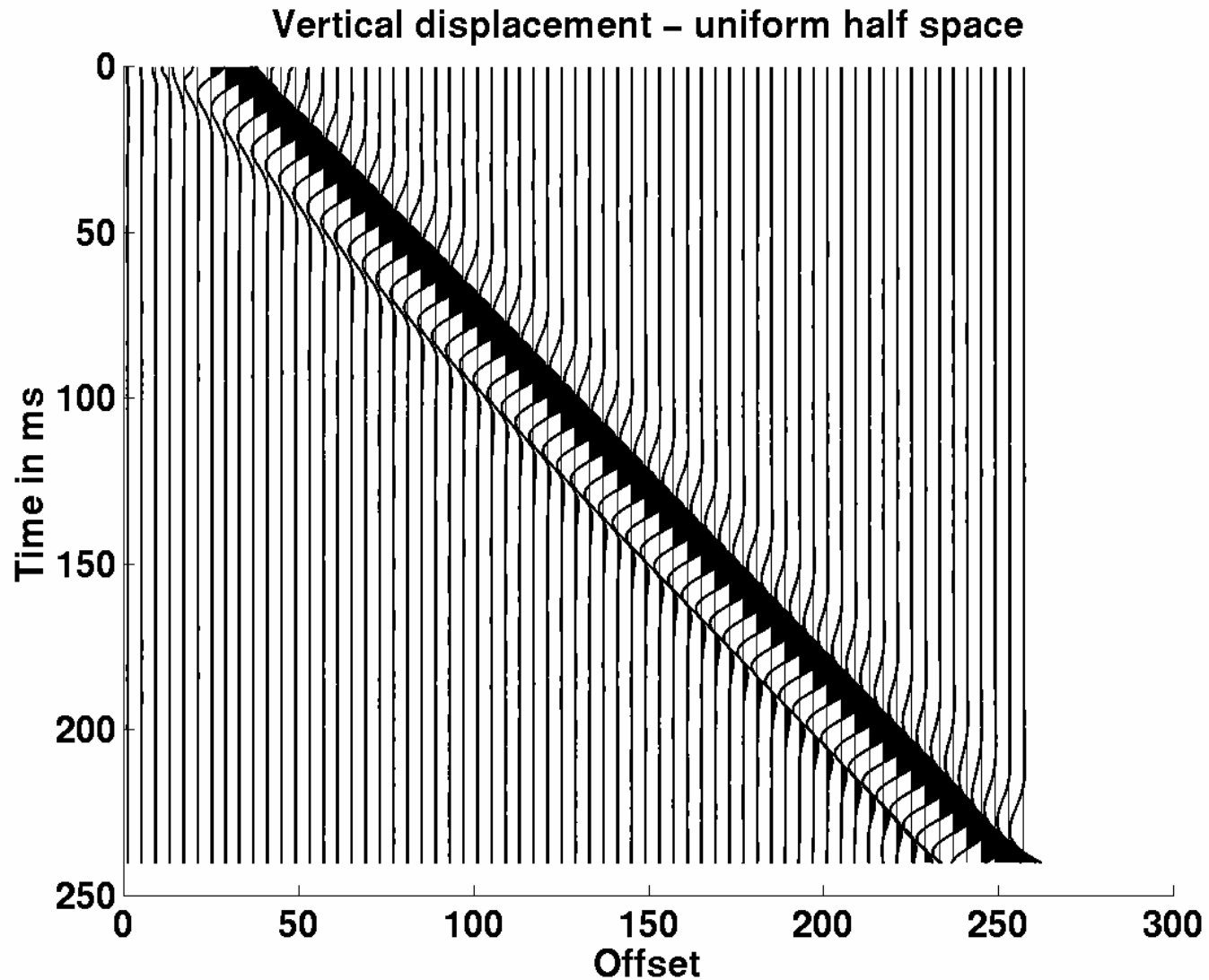# Seismic nearer a low shear velocity zone

Rayleigh wave

Displacement

Rayleigh wave

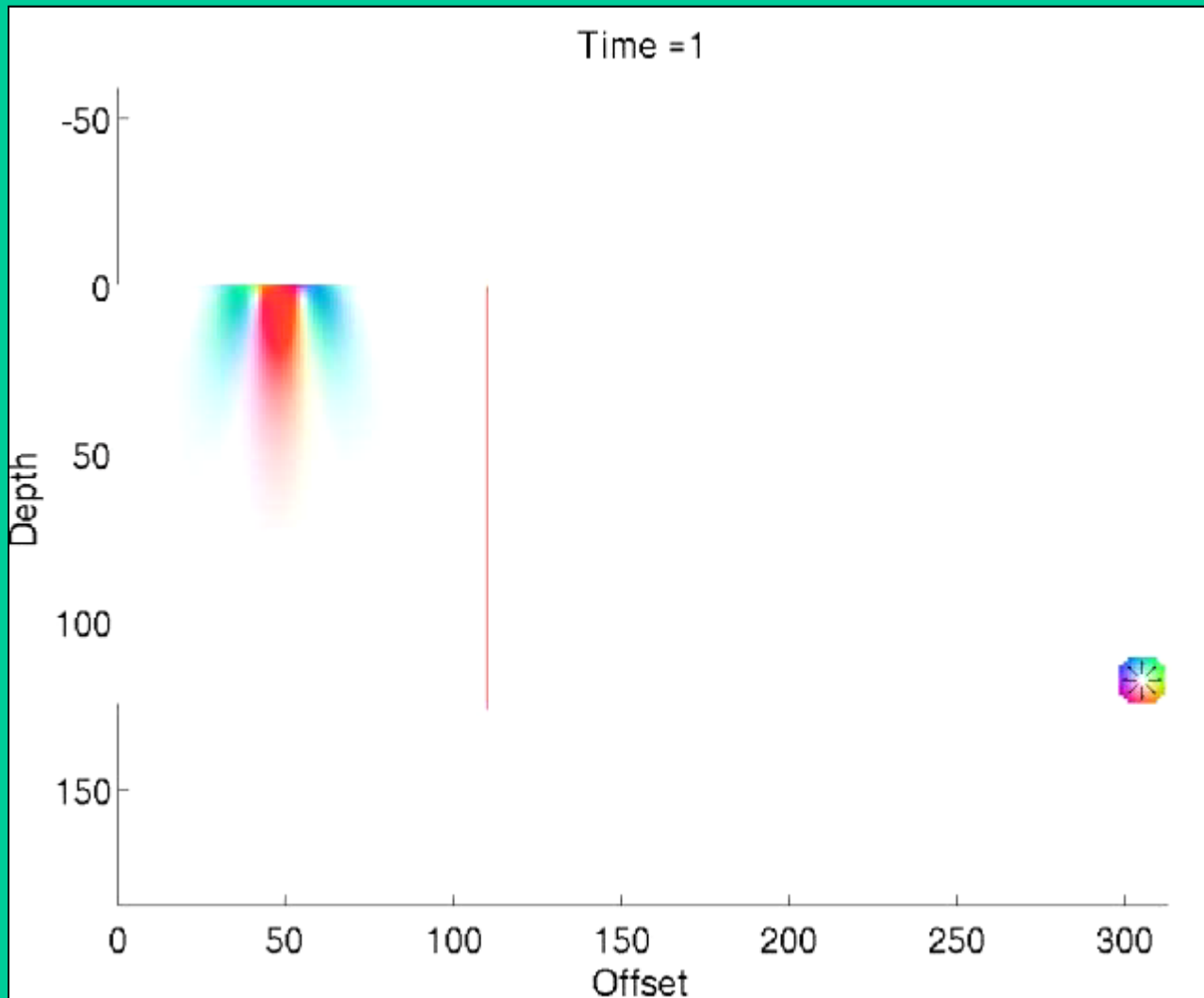**Vector displacement**
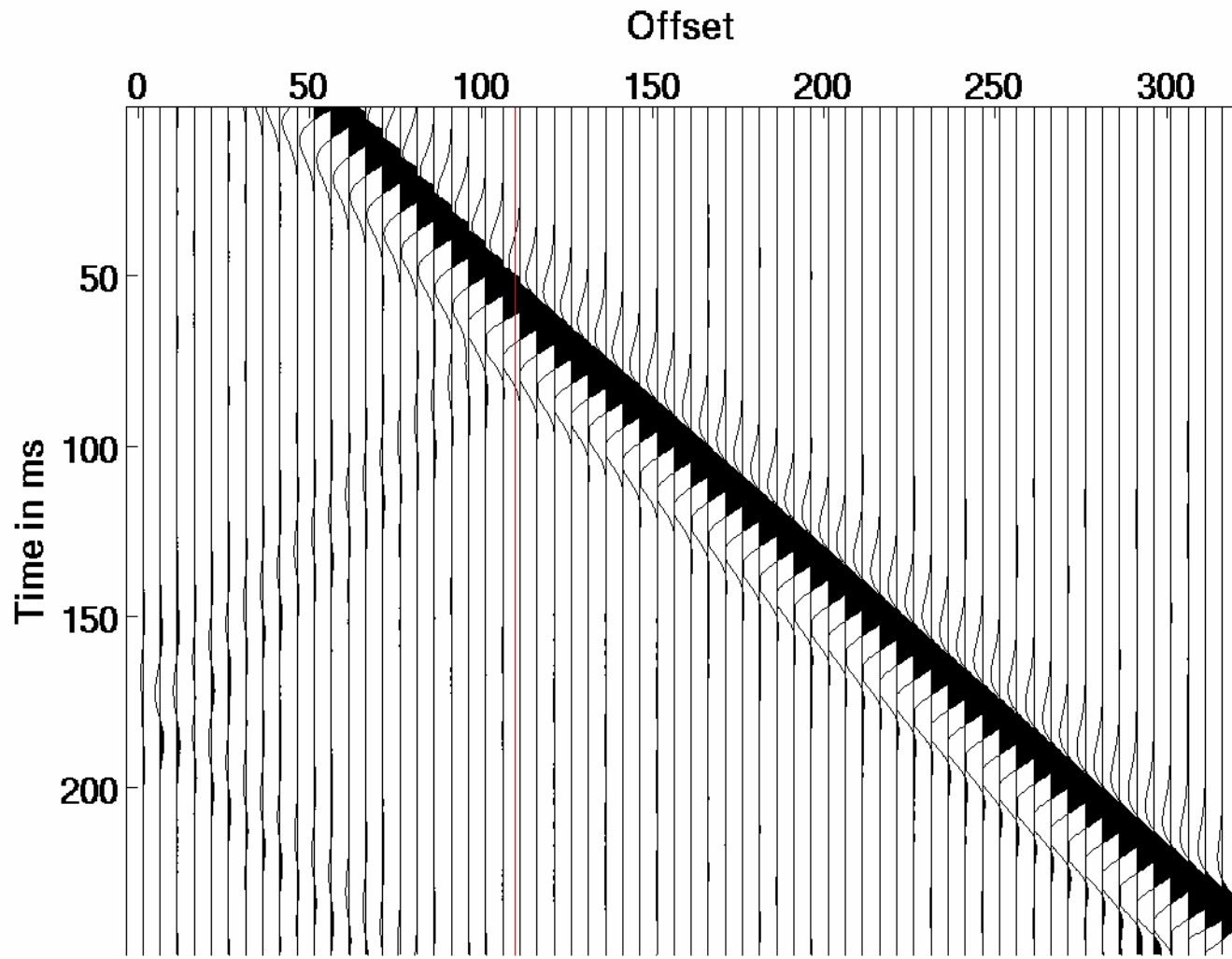
Surface wave on a half space

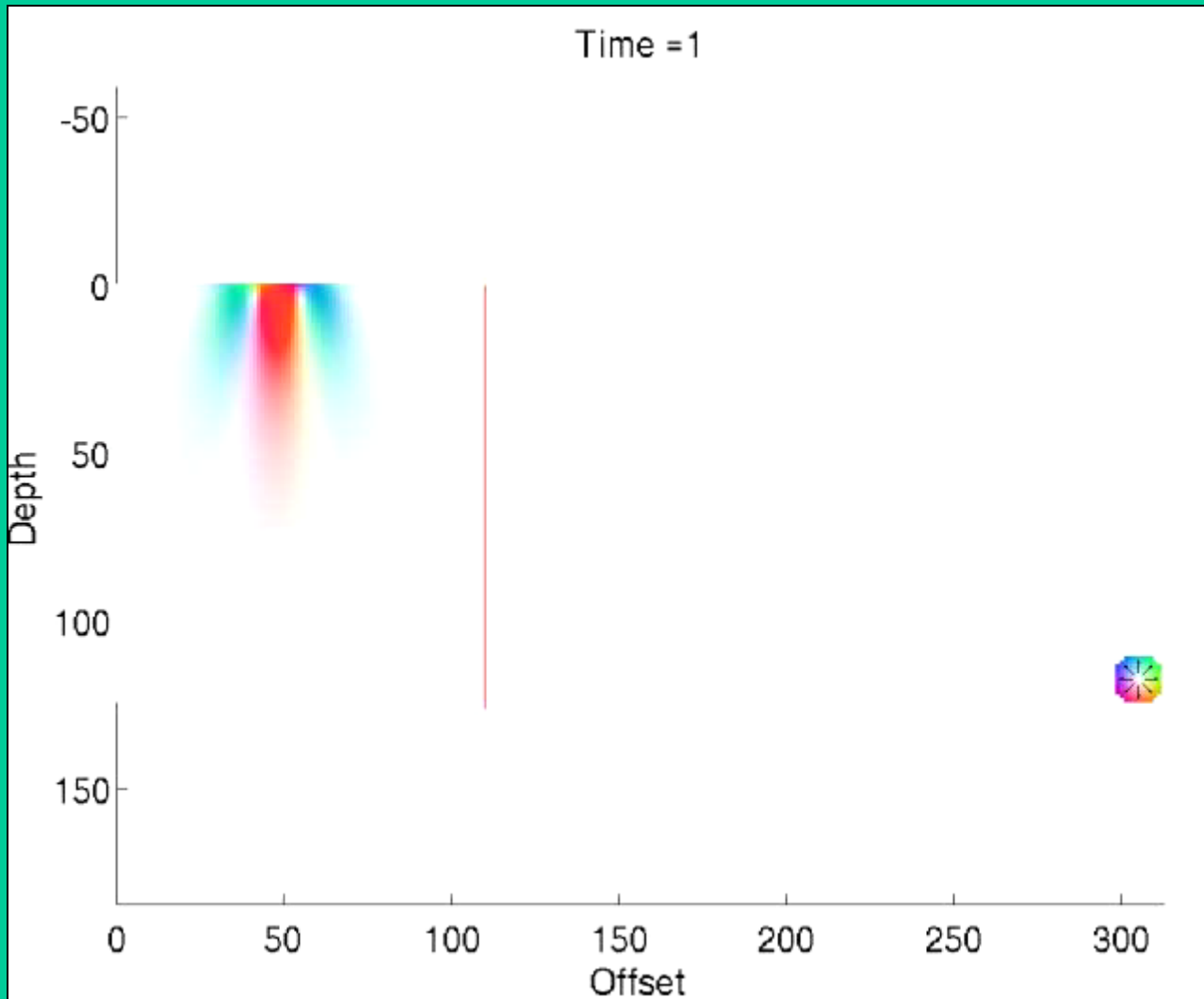Vertical displacement – uniform half space

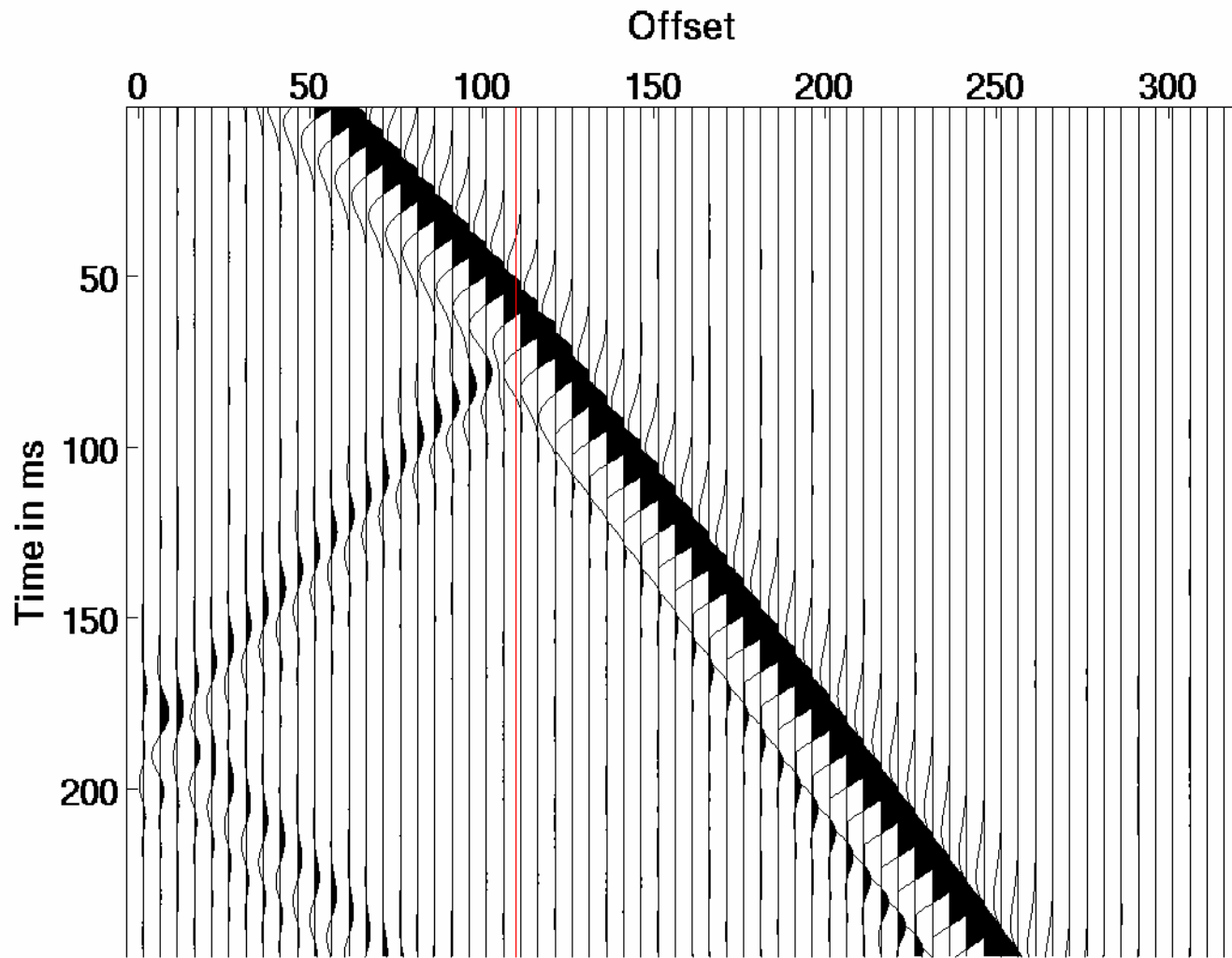# Rayleigh wave into a higher velocity

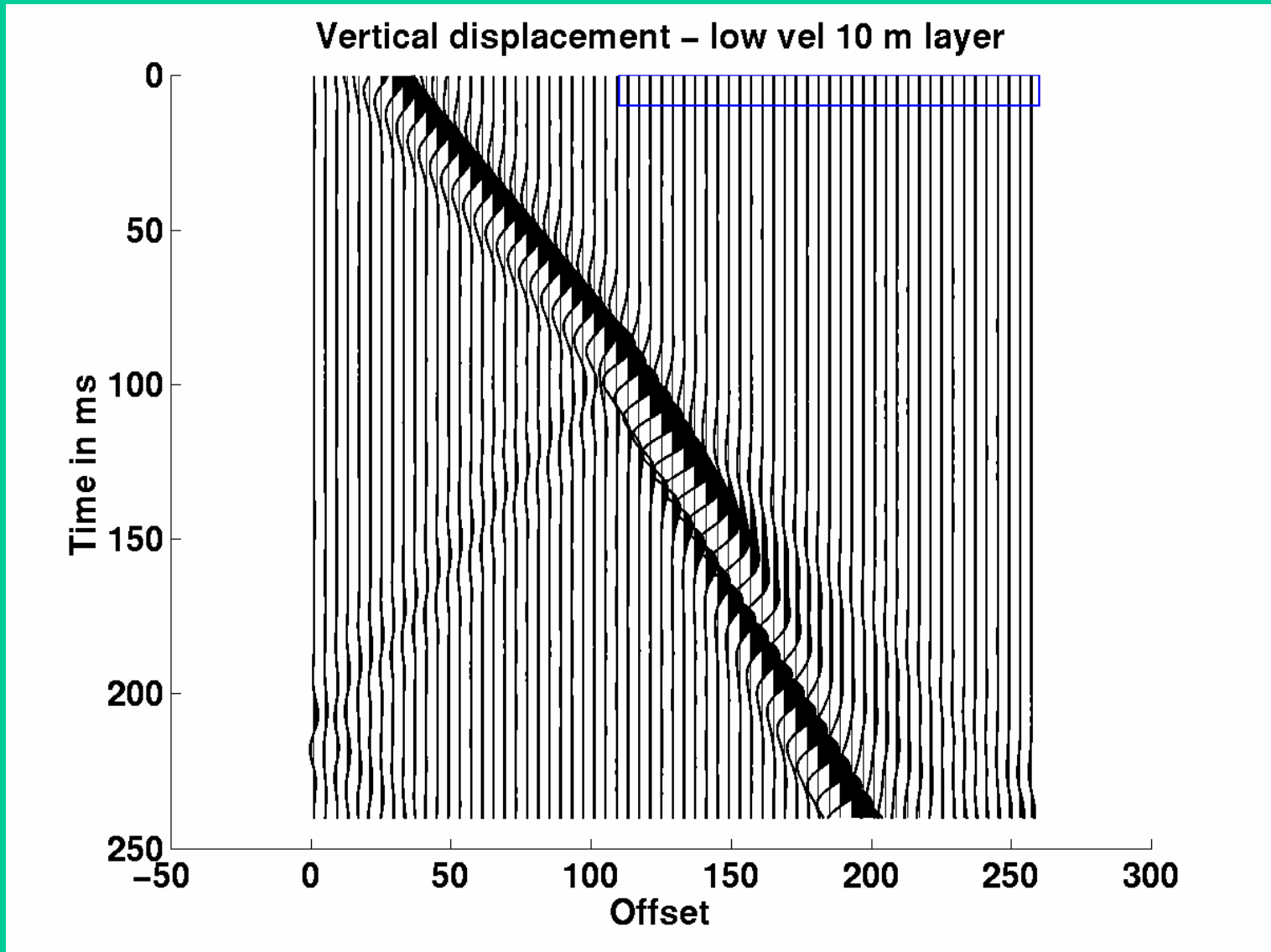# Rayleigh wave into a higher velocity

Rayleigh wave into a lower velocity

Rayleigh wave into a lower velocity

Surface wave into a thin layer, low velocity

Vertical displacement – low vel 10 m layer

Surface wave into a short layer, low velocity

Vertical displacement – low vel 10 m layer
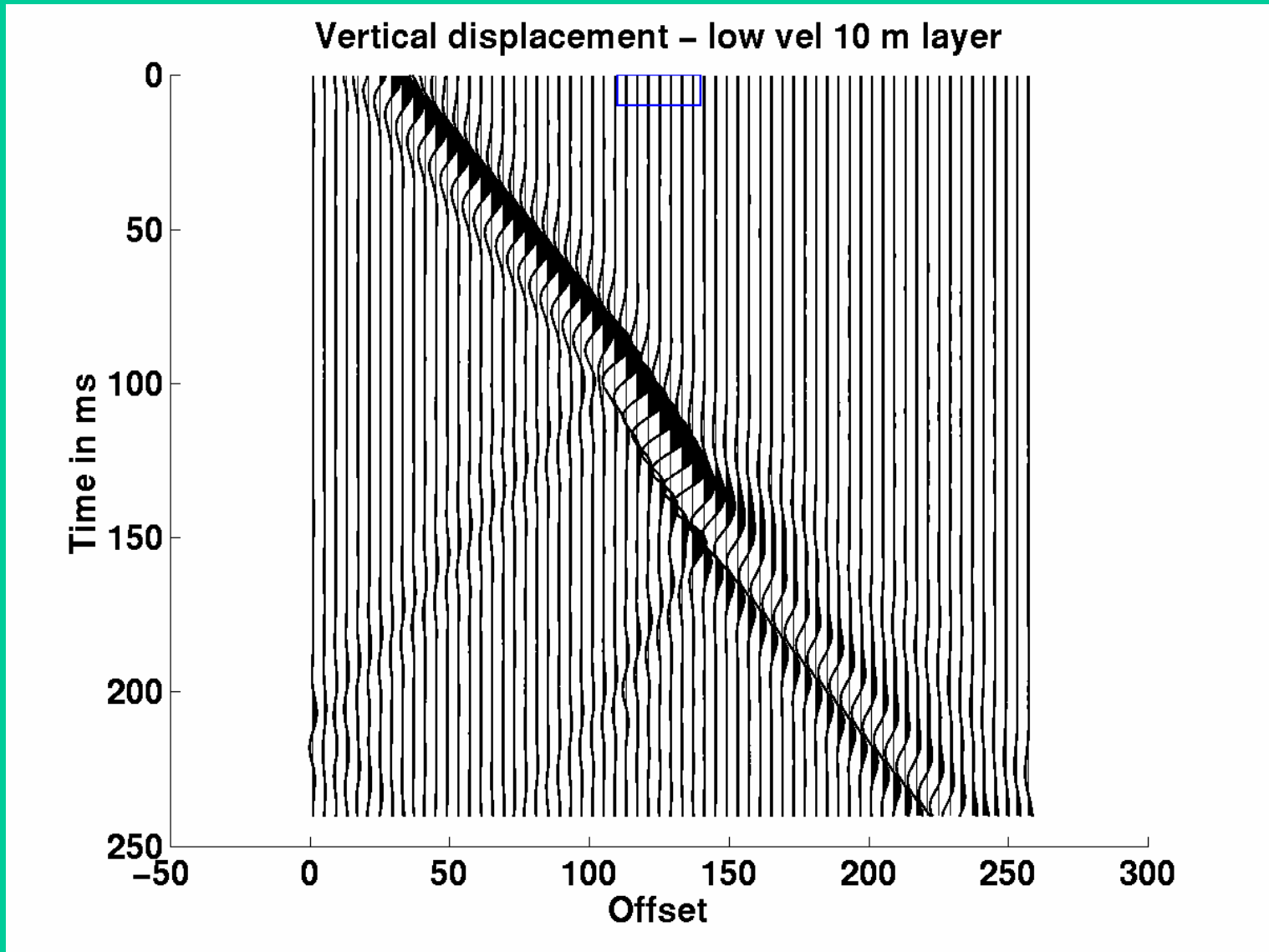
Surface wave into a thinner layer, low vel.

Vertical displacement – low vel 5 m layer
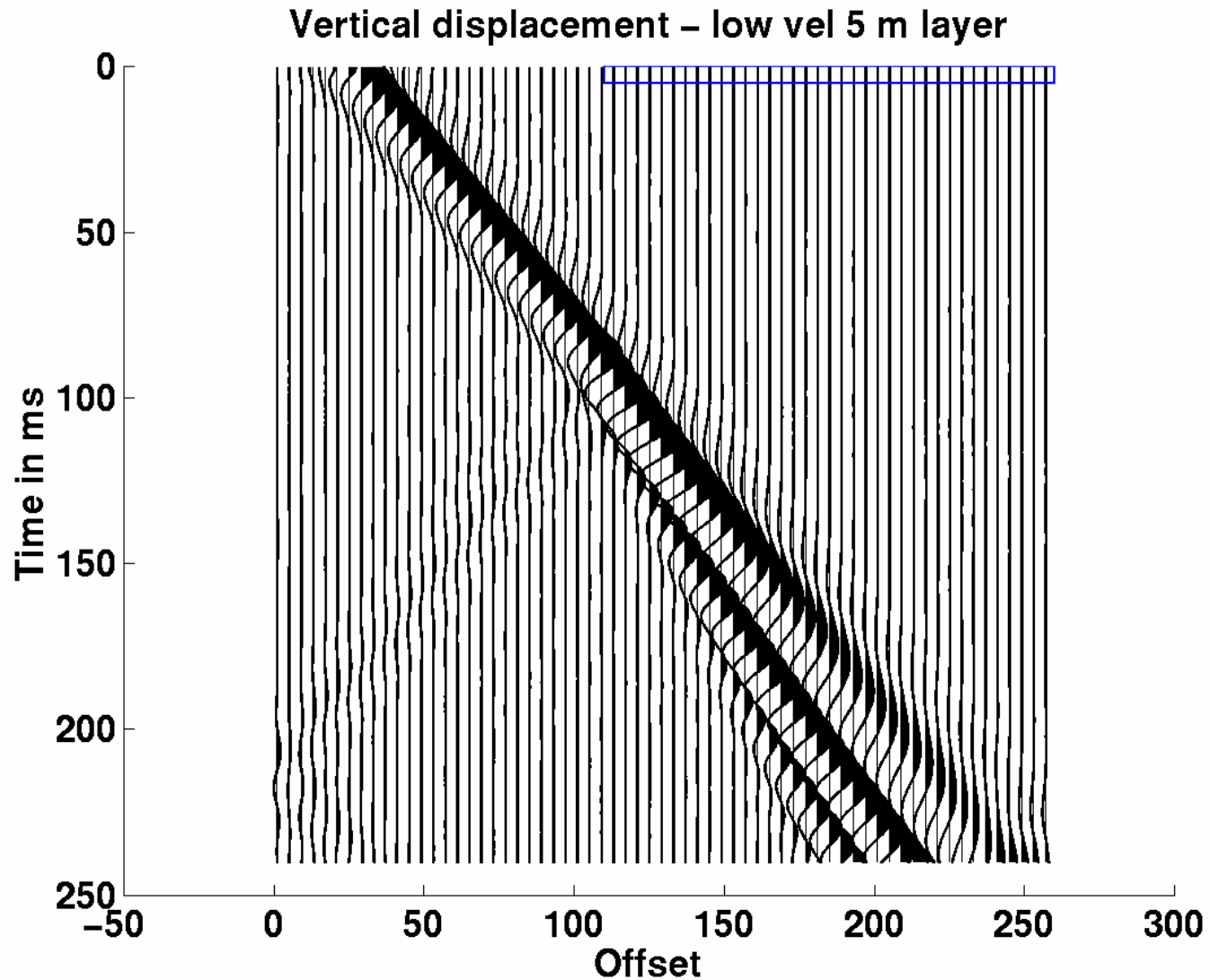
Surface wave into very low velocity layer

Low velocity 10 m layer
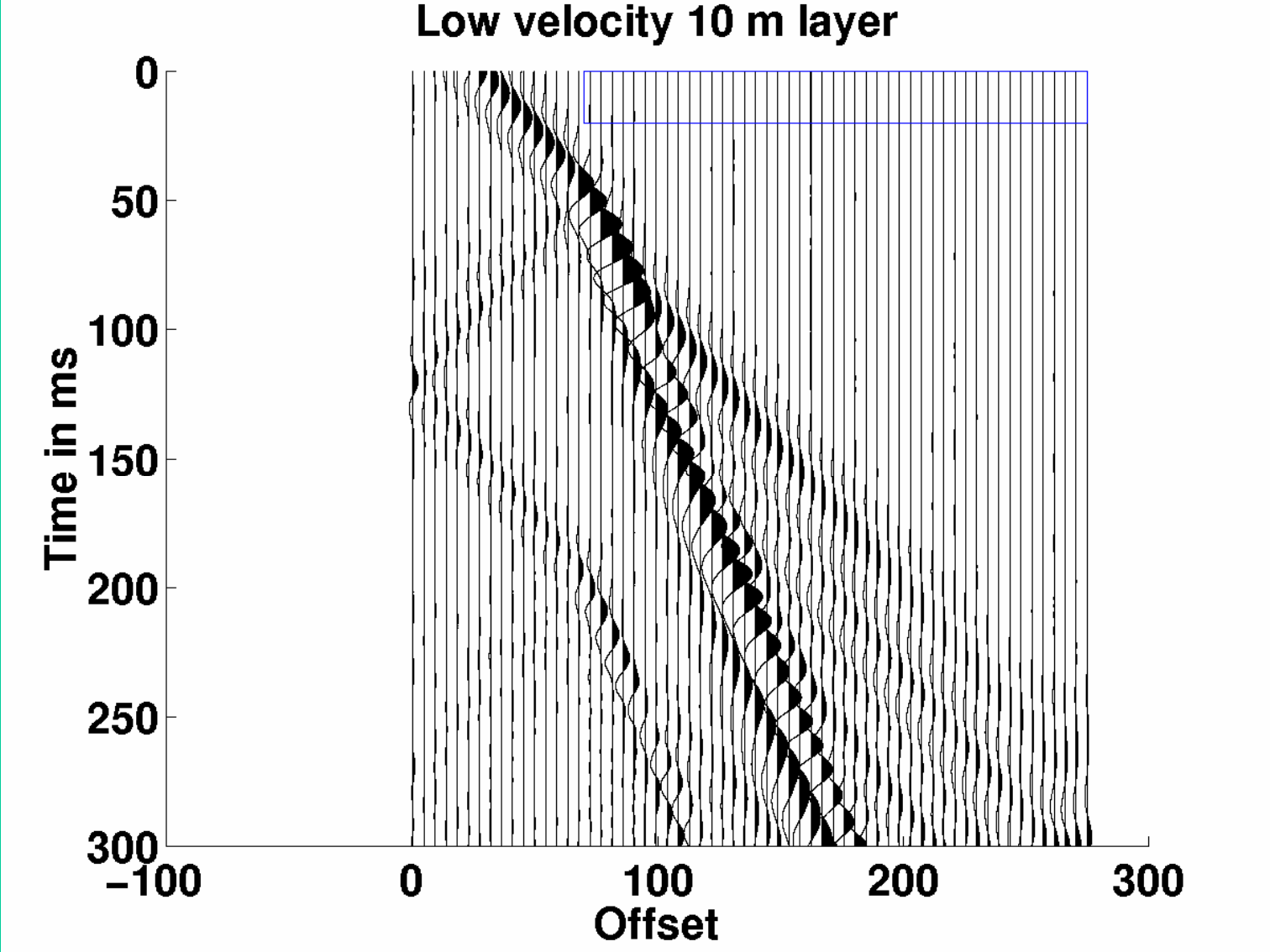
Conclusions

- Shallow shear velocity structure has a major effect on the Rayleigh waves of seismic recordings

- Rayleigh waves generate shear waves at the boundaries of contrasting shear velocity zones

- Despite this, the reflection and transmission of Rayleigh waves have similarities to body waves.

- There is hope to find some means of interpreting shallow shear wave structure from seismic Rayleigh waves.

Acknowledgements

We would like to thank the CREWES sponsors for their generous support.